WIDESCREEN REVIEW®
The Authoritative Journal Of The Widescreen Digital Surround Home Theatre Experience

December 6, 1996

William Caton
Acting Secretary
Federal Communications Commission
1919 M Street NW
Washington, DC 20554

Re: MM Docket No. 87-268

Dear Mr. Caton:

Yesterday I sent by Federal Express the Comments of Widescreen Review on the Digital TV Standards Agreement.

I had indicated in the cover letter that I had enclosed fourteen (14) copies, one in each packet, of an article which is to appear in Issue 22 (at the printer) which is entitled: "DTS® Licensee Manufacturers At The Vanguard." These were to be distributed to the Commission, plus three (3) additional copies for the below named copied gentlemen. Our office failed to enclose that article. Thus they are enclosed herein.

Thank you for your kind consideration and time.

Sincerely,

Gary Reber,
Editor/Publisher

cc: David Sidhall, Office of Commissioner Susan Ness
Robert Pepper, Office Of Policy & Planning
Sal Shapiro, Mass Media Bureau

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DTS® Licensee Manufacturers At The Vanguard

Gary Reber, Widescreen Review

1. What were the compelling reasons for your company to become a licensee of DTS® Digital Surround technology?
2. How do you see the differentiation between DTS Digital Surround and Dolby® Digital both in terms of performance and market perception?
3. What impact on home entertainment and home theatre systems do you foresee for music-only CD releases encoded in DTS Digital Surround?
4. Would you like to see DTS Digital Surround become one of the platform coding standards for DVD, Digital TV (HDTV), Digital VCR and DSS?
5. What are your company's plans for products incorporating DTS Digital Surround and at what price points and how soon do you expect to introduce product?
6. Now that our readers will have the opportunity to experience both discrete multichannel music in their home and in their car on DTS-encoded CDs, and motion pictures in their home theatre on laserdiscs and DVDs encoded in Dolby Digital and DTS Digital Surround, what advice would you offer when they are considering the purchase of a new surround processor or an upgrade to their present equipment?
7. Do you have any other comments on the direction of your company with respect to offering product featuring DTS Digital Surround?

DIGITAL dts SURROUND™

On September 4th, the DTS® Technology division of Digital Theater Systems announced that a group of 30 hardware manufacturers had committed to license and implement DTS Digital Surround circuitry for their A/V surround processors (please see Issue 21). *Widescreen Review* has addressed this group with a questionnaire for this exclusive On Screen feature. The purpose of the questionnaire was to gain an understanding of the compelling reasons why each manufacturer became a DTS licensee, their opinion regarding DTS performance and market perception, and their plans for product development. The invitation to participate in this feature was extended to every known (at press time) DTS licensee. Most of the companies responded, but a few did not—Citation, Lexicon, Harman Kardon, California Audio Labs, Mondial Designs/Aragon and Runco. The questions asked appear in the grayed highlighted question box that appears above and on each set of subsequent spread pages. All the DTS licensees unedited responses follow.

Each company's response corresponds to the numbered questions. The questions are repeated as a header to each page as a guide to the reader. We have provided every possible way for our readers to contact the company representative who responded to the questionnaire for further information and particulars concerning specific product introductions. As always, readers' letters are encouraged.

ada audio design associates

AUDIO DESIGN ASSOCIATES, INC.

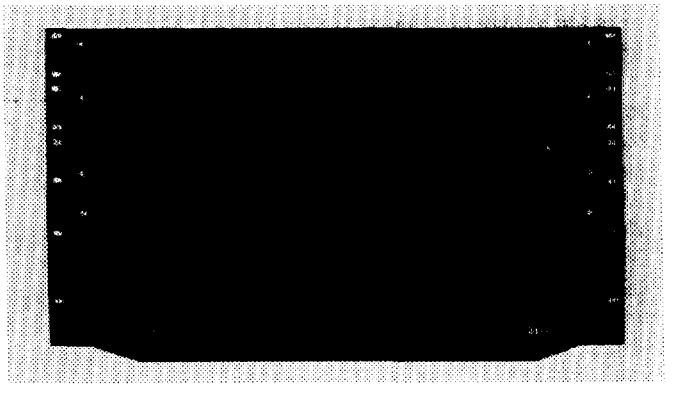
Albert G. Langella
President & CEO

1. Here at Audio Design Associates, research and development are an everyday part of our operation. The firm is engineering oriented and our mission statement is to continuously support and integrate the next generation of consumer electronics. Based on our commitment to keep our loyal customers ahead of the marketplace, new technologies are always of interest to us.

As with all new technologies, they are bench tested and given a sonic overview prior to making any engineering, production, or marketing decisions. When the DTS® Digital Surround hardware and software were first delivered, a system was immediately setup in our laboratories. After hours of critical listening to the demonstration materials, it was determined that the format performed extremely well. At that time, ADA decided to license the DTS Digital Surround technology.

2. Both Dolby® Digital (AC-3®) and DTS Digital Surround sound excellent. Each has its own sonic signatures. The benefit of having DTS Digital Surround available in the home market in addition to AC-3, is that laserdisc enthusiasts can now bring home both digital theatre experiences, just as in the movies.

3. Just as monophonic progressed to stereophonic and stereophonic tried to mature to quadraphonic, digital 5.1 appears to be the next level for music playback. While quadraphonic failed because of unnatural soundfields, the new recording techniques, as demonstrated in the DTS Digital Surround music CD, overcome these problems and enhance the musical experience. While solving the technical problems that have held back other multichannel music formats, I foresee the 5.1 format as a viable product in the marketplace. However, because the format will



ADA Digital Theatre

only operate with specialized decoding equipment, it will initially only capture a small market segment.

As more digital home theatre systems are installed throughout the world, the platform for digital playback will broaden, setting the base for acceptance of digital six channel music-only software. As more software is made available, ADA intends to market our Digital Home Theater System as a Digital Music System as well. We feel that many of our clients will use one Digital Theater System in the family room for both music and film playback, while using a second audio-only system in the living room for music playback.

4. We are a manufacturer of electronic components, and as such, are always leaning more towards inclusion rather than exclusion. From our perspective, the more available a format is, be it through a CD, laserdisc, digital video tape, DVD, or DSS transmission, the greater the likelihood of educating a new potential customer.

5. Our first DTS Digital Surround decoder, the DTS-1, is an external decoder with the standard 25 pin multichannel output connector. It has been shipping since August of 1996 and sells for under $1,000. The DTS-1 connects directly to ADA's SSD-66 (5.1) Dolby Digital AC-3 A/V Preamplifier, shipping since the summer of 1995.

6. This is a loaded question. Naturally, I would suggest that anyone who is interested in the latest technologies look closely to ADA. We introduced our Dolby Pro Logic® Surround Sound Decoder, the SSD-66, back in 1990. Since then, many happy SSD-66 owners have been able to upgrade their units to THX® (introduced in 1992 with the SSD-66THX), Dolby AC-3 (introduced in 1995 with the SSD-66 5.1) and DTS Digital Surround in 1996. If you were lucky enough to purchase our earliest ProLogic unit seven years ago and upgrade it today to AC-3/DTS, not only did you retained 95 percent of your initial investment but you were fortunate enough to select a manufacturer dedicated to the concept of obsolescence-free technology.

For your readers who are uncertain as to what the future of digital theatre is, let me echo the thoughts of many others by clearly stating that the future is here today. While playback systems such as Digital Video Tape, HDTV, and to some extent DVD, are still on the horizon, the 5.1 digital audio formats are here to stay. From my vantage point, I do not foresee significant changes in these decoding formats and as such, I would like to recommend to those individuals who are holding back, to put your worries aside. A digital home theatre purchase made today, will easily take you into the next century. Like me, you will hear just how dramatic a difference there is between matrix Pro Logic and discrete digital 5.1.

7. The next year marks the beginning of ADA's third decade as an electronics pioneer. Design is currently underway for ADA's second generation digital 5.1 A/V preamplifier which will incorporate both AC-3 and DTS Digital Surround decoding formats. Look for its debut at the 1997 Winter CES this January with the first shipments scheduled to coincide with our 20th Anniversary this May.

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Adcom
Robert Ain
Marketing Manager

1. Simply put, DTS® Digital Surround uses more data or information, which results in a more natural sounding analog waveform. That translates into dramatic increases in sound quality, which manifest themselves as complex musical textures and realistic three-dimensional sound stages. Adcom has always been known for high quality realistic sound reproduction. The use of DTS Digital Surround is one of the many tools that we use to bring a more refined experience to our customer.

2. Dolby® Digital (AC-3®) was developed with a specific bit rate ceiling in mind. DTS Digital Surround decided not to be limited by the same conditions and therefore created a coding scheme that reproduces more information. The challenge in the market is, of course, to educate customers as to the possibilities that exist without overwhelming them with options, confusing them and ultimately turning them off to the home entertainment experience. Today, Dolby Digital is well known and it appears it will continue to be the most used coding scheme. DTS Digital Surround over time will become an alternative for those customers that are interested in higher quality multichannel music reproduction.

3. Today we know that customers want to use the full capabilities (5.1 channels) of their surround sound system both for movies and music. DTS Digital Surround is capable of presenting a musically satisfying signal to all channels of the home theatre system simultaneously. Once a customer has experienced reproduced music in a well designed surround setting, such as that provided by DTS Digital Surround, the thrill and enjoyment of music listening increases dramatically. The new DTS Digital Surround CDs could help to drive customers to invest in new music and better equipment without having to wait for a new format to be created like the music-only DVD.

4. Of course, it is desirable for the customer to have the highest quality decoding available. There is always the risk of confusing our customers with too many options, therefore we believe DTS Digital Surround should be reserved for the more refined customer who understands and wants a higher standard of performance. That does have implications as to which formats it will be best suited for and, at this time, it is impossible to tell which vehicles will be best suited for DTS Digital Surround. As the formats evolve, the particular platforms which will be successful with an advanced coding scheme like DTS Digital Surround will become clearer.

5. Adcom plans on introducing products which incorporate DTS Digital Surround decoding in 1997. DTS Digital Surround will be featured in our higher end products and brought down to lower priced models as cost and customer interest dictates.

6. As a manufacturer we see it as our responsibility not to obsolete our customers investment in an unreasonably short time frame. Therefore, we always design our products with future changes in the market as a crucial design parameter. In addition, our new products are designed to integrate simply with our existing equipment. So the customer can focus on buying high quality equipment and not worry about the ever shifting tide of technology. In short, our advice is always buy high quality equipment from a manufacturer that doesn't use the platform of the weak approach to product design.

7. Adcom is always looking for ways to improve the experience that our customers have with our products. As new formats and other high performance home theatre technologies like DTS Digital Surround become available, we will continue to focus our development efforts on manufacturing more refined, more emotionally involving products.

Gary Reber, Widescreen Review

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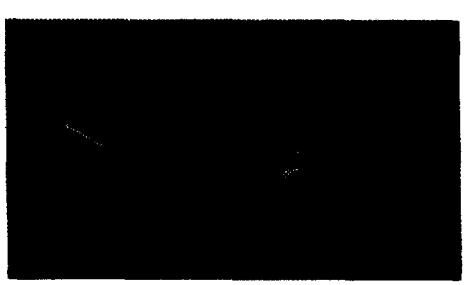
Angstrom

Angstrom
Mike Moffat
President

1. We at Angstrom are pleased to be able to offer DTS® Digital Surround upgrades for our Model 200 surround sound processor. We have been doing so for over three months now and began to offer the DTS Digital Surround upgrades as soon as we were assured that movie releases in the DTS Digital Surround format would be available. In fact, we believe we were the first to do so.

2. The current situation of two available digital coding schemes for home theatre has an apparent good side and bad side. The bad side brings to mind the Beta and VHS war of several years ago. This may confuse the consumer and make him think that he must choose between them; this will not always be the case. It is likely that much software offered in DTS Digital Surround will not be offered in Dolby Digital® and vice versa. Since in our case, the DTS Digital Surround upgrade for our processor is less than 11 percent of the price of the unit makes it relatively inexpensive to enjoy the additional software available. This makes the good side of the quandary above to be the ability to enjoy additional software for a relatively small hardware price. Another benefit is whenever there is competition in a free market, as there is between Dolby Digital and DTS Digital Surround, the quality of the product improves and the price lowers.



Angstrom Director 200

3. The fact that DTS Digital Surround laserdisc software occupies the entire 1.411 megabit bandwidth of the PCM digital audio track on the laserdisc, gives them a lower compression sonic advantage over the 384K bandwidth of the Dolby Digital implementation. What is unknown to this manufacturer is how the two coding schemes compete sonically at the same bandwidth. It would be interesting to hear a comparison. There is an advantage to the Dolby Digital software buyer who does not have a Dolby Digital decoder in that the PCM track is preserved; this permits a higher quality of reproduction than in the case of the DTS Digital Surround user who does not have a DTS Digital Surround decoder, with only the analog tracks remaining. In the future, as hardware prices drop and more users have Dolby Digital and DTS Digital Surround decoders, this will become far less of an advantage.

4. Since Dolby Digital is required for the increasingly late DVD format, it is vital that the DVD user have a Dolby Digital decoder. We are personally at Angstrom unconvinced that compressed video formats have the most to offer for those who seek the highest performance, particularly when things move. This brings to mind the situation which prevailed when compact discs became available in the early eighties. There were valid concerns about the performance of digital audio performance in the context of good analog performance at the time, which resulted in a resurgence of analog audio sales among those who cared the most about the quality. When DVD appears, we believe there will be a similar phenomenon with laserdiscs. Time will tell.

5. See answer one.

6. For the moment, given our feelings about sonic quality, we are happy to be able to enjoy new DTS Digital Surround software titles available at the much higher data rate than Dolby Digital. We cannot comment on which coding scheme is better until we hear a neutral, unbiased comparison between the two such as in a software provider's site. Meanwhile at Angstrom, we provide both for our user's pleasure.

7. (No comments submitted.)

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B&K Components, Ltd.
John Beyer
President

1. The race to digital transmission of A/V is an ongoing theme in the current marketplace. DTS® Digital Surround, because of its ability to be compatible with current-day CD and laserdisc players is the primary reason DTS Technology is of interest to our industry.

2. Dolby® Digital is the clear market standard on laserdisc players, DVD players, DSS and cable broadcasting. DTS Digital Surround is the dark horse; if it is a race to one standard. I believe that due to the capabilities of future electronics in the DSP domain, the market will be able to support multiple standards that are invisible to the end user (both Dolby Digital

and DTS Digital Surround).

3. Music-only is a wonderful addition to what can be experienced in the home. Surround sound audio for musical reproduction can be a great step forward to the impossible goal of the recreation of live music in the home.

4. The DTS Digital Surround standard for encoding and decoding is already a standard at some levels. The question I think you are implying is will software companies (makers of CDs, tapes, etc.) support the standard, as well as the broadcast people? Manufacturers of equipment I believe will support the DTS Digital Surround standard if software companies provide material (software).

5. B&K's plans include introduction of a DTS Digital Surround preamp/tuner/processor in the first or second quarter of 1997. Our long term goals also include an audio/video receiver with DTS Digital Surround, with a planned retail price of around $2,000.

6. I think that the critical issue for consumers is to find a product that meets their current needs and is expandable to meet future digital needs in terms of audio and audio/video. We entered the digital age with the introduction of the CD player. DVD and other mediums are now improving on that original idea. Make sure your equipment purchases offer a proven upgrade path.

7. B&K is committed to the digital transformation taking place in the marketplace. We have designed all of our audio/video preamps starting from the AV1000 and AVP2000 to be both software and hardware upgradable. We look forward to serving all of our customers in the next millennium.

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BRYSTON

Bryston
Christopher Russell
Vice President, Engineering

1. Bryston intends to become a DTS® Digital Surround licensee because this format is considered to be of high-end quality, due to the significantly higher average and maximum bit rates in that format.

2. Dolby® Digital has higher compression, thus is natural for bandwidth-limited transmission and storage media, such as TV and satellite feeds. DTS Digital Surround is perceived to be more useful in quality-intensive applications such as music and home theatre.

3. DTS Digital Surround has a potential for even better overall quality than CD for music-only applications, having a maximum system capability of up to 24 bits at 96kHz.

4. There is no reason DTS Digital Surround should not be used on these formats and probably many reasons why is should.

5. Bryston is planning a surround sound processor to incorporate DTS Digital Surround though exact price-points and introduction dates are still under scrutiny.

6. The best advice we can offer is to listen carefully to determine the audible differences between the formats and to choose equipment which offers more than a single option.

7. Bryston will concentrate, as always, on providing the best performance available at the state-of-the-art, in a surprisingly affordable price range.

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CARVER

Carver Corporation
Mark Walters
Director Of Product Development

1. Carver became a DTS® Digital Surround licensee because we feel it is our mission to provide the highest performance audio reproduction equipment technologically possible to our customers. DTS Digital Surround has the potential to deliver both the quality and the value our customers have come to expect form Carver.

2. It seems clear today that DTS Digital Surround not only has the advantage of using the 44.1 kHz sampling rate making it compatible with a large installed base of CD and Laserdisc players but they also have caught the interest of the audiophile music customer with their "high-road" 20-bit pass-through approach. Dolby® Digital is perceived to be optimized for lower performance "mass consumer" video applications.

3. Multichannel music-only software will enhance the importance and enjoyment of peoples' home theatre systems. This trend will tend to increase the level of performance required from these systems and thus promote a shift towards higher quality systems. I think multichannel systems, by virtue of their newness and ability to immerse the listener in the soundfield, will promote more serious listening as opposed to the casual almost background listening most consumers do today.

4. Yes, it would be nice to see the newest, highest performance, technology included in future standard specifications. My greatest fear, however, is in confusing the public and in creating another VHS verses BETA scenario. Regardless of what the chip manufactures may tell us, it costs significantly more to support multiple decode algorithms. This is an additional cost most consumers see no additional value in.

5. Carver is currently working on a family of preamplifier/tuners that share a open-architecture DSP design philosophy. This open architecture will allow us to incorporate the highest value technology available at the time of market release. Carverís position in the marketplace is one of high performance and high value. Our product development process is both technology and value driven. As such we try to beware of early adoption syndrome. Our market release dates will be set by the availability of software and by the availability of reasonable cost DSP engines. Both of these will happen as the market matures.

6. It is a hard time to be a consumer right now. One would like to have the newest technologies, however, early adoption and rapidly changing technology have there costs, just ask anyone who purchased a 386 PC computer. Purchase high quality, flexible, upgradable components like Carver separates. At Carver we prevent future shock by designing and producing products that are future perfect!—flexible separate components that can be upgraded or added on to. The reader should be sure that the manufacture has a history of providing both high quality and high value upgrades or add-on processors, like Carver. Stay away from the very first on the market products, rarely do these products have both the performance and value of second generation products. The time span between first and second generation products is getting shorter, so it is even more compelling to wait for the first round of products to fade

Gary Reber, Widescreen Review

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and to purchase second round products.

7. Carver is very excited about multichannel music reproduction and DTS Digital Surround. We were building multichannel sound processors of our own design back in the 1970's. We will be releasing DTS Digital Surround hardware when both the software and DSP markets can support a value as well as a performance product.

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Classé

Classé Audio

Mike Viglas
President
James Shannon
Vice President, Sales And Marketing

1. Classé Audio has deep roots in the world of two-channel audio. Our company was founded with the premise that we had something legitimate to offer the world. We believed at that time (and we feel even more strongly today) that we are able to offer a unique approach to high performance, with a special emphasis on value for the dollar. DTS® appears to be a company which shares our vision for higher performance. It is clear that the surround formats available to this date have not offered the same level of musical performance as we have been able to achieve with two-channel audio. It is our belief that DTS is among the companies which have pushed for higher resolution and greater musicality in surround sound formats. Classé Audio is very interested in forging partnerships with those within our industry who can create software and software formats which offer the highest possible audio performance. If DTS can achieve higher resolution surround sound performance, we will support their efforts. This is only good business, as their success will yield greater opportunities to appreciate the performance advantages of our own product range.

2. Dolby® Laboratories has clearly been the market leader in the development of market awareness of surround technology in general, as well as innovation in bringing a specific new digital format to the market. Dolby has always done an admirable job of balancing real-world performance issues with broad based marketing considerations. This positions them as the ideal company for bringing digital surround technology to the masses. DTS has approached the market with a perceivably narrower focus on performance, while simultaneously trying not to be so narrow as to make the format too expensive or too limited in appeal. As Classé Audio's own focus is clearly performance-driven, we believe that there are clear benefits to offering DTS Digital Surround as well as Dolby Digital. We hope to build products which get the greatest available performance from the Dolby Digital medium, while also offering the potential of even greater resolution and musicality offered through the potentially higher-resolution DTS Digital Surround format.

3. There is a slow but persistent movement in our industry towards multichannel playback for music as well as for home theatre. Most previous attempts to create a multichannel playback standard for music have failed because of the obvious inferiority (with respect to timbre, harmonic accuracy, and emotional realism) when these systems were compared with the best two-channel playback systems. Despite the obvious advantages in spatial presentation, the failure in these more fundamental musical attributes was cause for many music lovers to dismiss these early attempts to create a surround sound standard for music. DTS appears to have attacked the problem at its core, by working with a technical standard which offers higher resolution than other existing surround formats. We are very confident that high performance Compact Discs will continue to be purchased and enjoyed by the vast majority of music lovers, but that we might see an additional group of enthusiasts who choose to focus upon multichannel playback for their musical enjoyment as well as their home theatre enjoyment.

4. Clearly, our interest in the highest playback performance would lead us to support DTS Digital Surround as one element of any platform for DVD, HDTV, Digital VCR, and DSS formats. While we understand the need for industry compatibility, we would certainly hope that these new formats do not suffer the same problems as we have seen with certain previous formats; i.e., standards which are less well resolved than the capabilities of the playback equipment with which they will be used.

5. We are currently in the late development stages of our first Classé Audio Surround Processor/Control Center. We hope to have this product in production during the first quarter of 1997. Pricing and further details will be announced very soon.

6. Clearly, this is an opportunity for many new levels of musical enjoyment. We know that many consumers have already begun to create multichannel listening environments in their homes, and they will be pleased to know that these rooms will serve to be a focal point for many types of home entertainment media which are becoming available. We plan to ensure that Classé Audio can be seen as a legitimate high performance option for each and every format, from the simplest two-channel musical playback system, to the most sophisticated multichannel home theatre. Our advice to consumers is to make certain that the equipment they purchase has the flexibility to offer the best performance in each format which is current and proposed (two-channel stereo, HDCD decoding, Dolby ProLogic®, THX®,

Dolby Digital and DTS Digital Surround). We believe that the available software for each of these formats will necessitate a system which can simply and elegantly offer the best performance with any one of these formats.

7. We would simply encourage all readers of *Widescreen Review* to sample as much of the new music and film as they can. We are truly fortunate to live in an era when we can bring the great orchestras of the world, the great films of the world, and many other fabulous forms of entertainment into our own homes! We hope that all of us will stop to think of the amazing steps that have been taken by all of the engineers and designers who have brought us to this wonderful time. We hope that Classé Audio's efforts will be seen as a genuine effort to make the scale and emotions of any music or home theatre performance more immediately accessible to every listener and viewer, no matter which format is chosen.

Incidentally, we are seeing a bit of a renaissance in high quality two-channel audio playback. At the risk of sounding "tweaky," we believe that many of your readers may not yet have experienced the magic of a well-installed two-channel CD-based system. In addition, we believe that our current CD playback systems are likely to exceed the musical performance capabilities of the first few generations of DVD or any of the other proposed formats. Our goal is to create products which will enable an optimum experience for both the two-channel music lover and the multichannel home theatre enthusiast. We have great confidence that our surround processor will serve as the ideal centerpiece for such systems, particularly when combined with our digital processors and CD transports.

Thank you for the opportunity to participate, and thank you for the very serious efforts of *Widescreen Review* to enhance the performance characteristics of all home theatre playback systems. We know that it will require the concerted efforts of many serious enthusiasts and journals (such as *Widescreen Review*) to push the industry to accept standards of playback fidelity which have the potential to satisfy the most critical listeners. We sincerely hope that this forum will lead to further discussions about ways to improve and enhance the standards of each current and proposed format for music and film playback.

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COUNTERPOINT
Handcrafted in California

Counterpoint Electronic Systems, Inc.

Laura Hendershot
Chief Executive Officer

1. From the start, it was apparent to us that the folks at DTS® Digital Surround were serious about sound. They took great pains to insure that the maximum amount of sonic information was preserved. They did not allow their system to be compromised. They graciously took time with the high-end (specialty) audio community to demonstrate that fact.

2. Of course, Dolby® are the big guys in terms of licensees, and there exists a bit of a David-and-Goliath situation on the face of things. However, once consumers become aware of the fact that DTS holds the lead in terms of digital surround sound theatre installations, that perception changes. Performance is the most important aspect for Counterpoint customers. DTS Digital Surround has an edge both in sound quality and in terms of the available software library.

3. Music-only surround offers a new dimension to the artists, both literally and figuratively; Instead of performing only in time, pitch and amplitude, spatiality gets added to the equation. This gives us a whole new dimension. It truly boggles the mind, and I can't wait to see what some of the more innovative performers do with it.

4. It is unclear with each of these new mediums how much compression must take place, and how much of it is lossy. The good news is that with the upcoming audio-only DVD, there is going to be a tremendous amount of information available for sound. This is because of the hard work by such groups as CEMA (Consumer Electronics Manufacturers Association) the ARA (AcousticRenaissance For Audio), and AAHEA (The Academy for the Advancement of High-End Audio). The big question is just how all this capacity is going to be used: More channels? Better two-channel? More music on each disc? A bit of video, perhaps?

However, where lossy compression must take place, DTS Digital Surround seems to have taken the leadership position in terms of preservation of fidelity.

5. We intend to have a surround sound processor that will play both Dolby Digital AC-3® and DTS Digital Surround, by using a "main frame" chassis with available daughterboards to give consumers as many options as possible. Additionally, this will allow for upgrades as technology improves. This product will be ready in early spring 1997 with an MSRP of $3,995.

6. Wow, I think I just answered that one with my last response! User upgradability, which has been so successful with our D-to-A converters, will also be available with our new surround sound processor. When one purchases our surround sound processor, it's an investment in future technologies.

7. Counterpoint is pushing very strongly into the Home Theatre market. We make complete, critically acclaimed integrated systems, and offering the DTS Digital Surround processor gives us an additional chance to show off our ability with digital products. As a high-end audio company, we are very pleased to be involved with the quality-conscious people at DTS.

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Enlightened Audio Designs

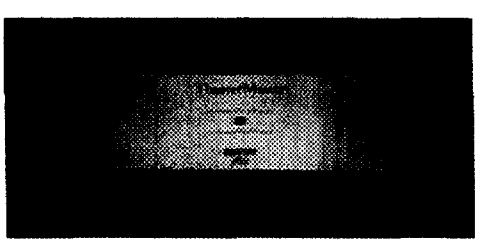
Enlightened Audio Design Corporation

Alastair Roxburgh
Vice President, Engineering

1. We decided to become a licensee because of demonstrated transparency and consummate high-end quality, as well as DTS Technology's commitment to bring this quality to a variety of delivery platforms, including CD.

2. So far, the nay-sayers about Dolby® Digital have had to eat their words. For the most part, the seventy-or-so Dolby Digital soundtracks that we currently have deliver excellent sound. The only direct face-off that I've personally experienced between DTS® Digital Surround and Dolby Digital was with the soundtrack for New Line Cinema's *The Mask*. This session took place at *Widescreen Review* early in

1995, and was attended by many industry luminaries. The prevailing opinion among those present, and as voiced by the late Peter Mitchell, was that "the difference was so slight that [he could] barely find words to describe it." At the session we compared several versions of the soundtrack of *The Mask:* 1.411 megabits per second DTS Digital Surround laserdisc, 384 kilobits per second Dolby Digital AC-3 laserdisc, and the 6-channel (16-bit) printmaster tape. Had the resolution of *The Mask* soundtrack been 20 bits, we may have come to a different conclusion. Comparing the general qualities of *The Mask* soundtrack to that of Universal Pictures' *Jurassic Park*, I seem to hear a difference. I don't know if the original printmaster of *Jurassic Park* is 16 bits or 20 bits, but listening to the DTS Digital Surround version of this soundtrack, there is a high level of activity encoded in the surrounds that I've never experienced in Dolby Digital movies. It may be that the DTS sound designers have more design freedom due to DTS's fixed partitioning of the 1.411 megabits per second channel vs. Dolby Digital's bit-pooling approach, or it may be a case of 1,411 megabits per second vs. 384 kilobits per second, or it may just be a case of different sound design philosophies. Both the Dolby and DTS encoding schemes are very intelligent, and can both give very good results on movie soundtrack material. But for high-end music recordings? Well, Dolby has never claimed that 384 kilobits per second AC-3 is transparent (although I think I am not alone in feeling that a 1.4 megabits per second version of AC-3 would be truly awesome!). Perhaps it is significant that only DTS is prepared to use a full 1.411 megabits per second and only DTS is going after the multichannel CD music market. We all need a transparent 5.1-channel music delivery system desperately. Once you've heard good multichannel music (e.g., Alan Parsons' new DTS album *On Air*) there is no going back! But enough of my own perceptions. The issue of market perception is a tricky one because most of the market is only dimly aware of Dolby Digital and DTS Digital Surround, and has not voiced much of an opinion. Then there is the issue of MPEG audio. In an ideal world, I would not include MPEG audio encoding, particularly the variety used by DSS. It is very easy to uncover the "dark side" of MPEG audio by listening to a monophonic DSS program in Hafler matrix or Dolby Pro Logic modes. Theoretically, a monophonic program should have nothing in the surrounds, but I know you'll be horrified by what you hear there with DSS. DSS encodes the left and right audio channels differently, even when they are the same signal, and this difference varies with time in some weird way.



EAD TheaterMaster™

Gary Reber, Widescreen Review

1. What was the compelling reason(s) for your company to become a licensee of DTS® Digital Surround technology?
2. How do you see the differentiation between DTS Digital Surround and Dolby® Digital both in terms of performance and market perception?
3. What impact on home entertainment and home theatre systems do you foresee for music-only CD releases encoded in DTS Digital Surround?
4. Would you like to see DTS Digital Surround become one of the platform coding standards for DVD, Digital TV (HDTV), Digital VCR and PSS?
5. What are your company's plans for products incorporating DTS Digital Surround and at what price points and how soon did you expect to introduce product?
6. Now that our readers will have the opportunity to experience both discrete multichannel music in their home and in their car as DTS-encoded CDs, and motion pictures in their home theatre on laserdiscs and DVDs encoded in Dolby Digital and DTS Digital Surround, what advice would you offer when they are considering the purchase of a new surround processor or an upgrade to their present equipment?
7. Do you have any other comments on the direction of your company with respect to offering product featuring DTS Digital Surround?

3. Having listened to a wide variety of music-only discrete multichannel material recorded in DTS Digtial Surround, we at EAD see it as a revolution in the making, freeing us at last from the legacy of two channels imposed on us in the late 1950s by the mechanical limitations of the 45°-45° stereo microgroove.

4. We would like to see 5.1 channels of audio delivered in a high-quality format for all of the delivery systems mentioned. Next week would not be too soon. DTS Digital Surround deserves to be considered on an equal footing alongside competing formats, especially as the new digital media have the capacity for more than one format. Due to the fast rate of development of new and improved multichannel coding systems, a provision for future multiple formats is a virtual necessity. Although it was not planned as such, laserdisc started out with a single audio format and now provides, at last count, a total of four. The two newest (DTS Digital Surround and Dolby Digital) provide a much higher quality, more involving experience than the previous (two channel) formats could ever hope to achieve.

5. The beginning of October saw initial shipments of new DVD/DTS Theater Master® models ($7,790 and $10,790) that have DTS Digital Surround alongside Dolby Digital, and Dolby ProLogic®, as well as Hafler matrix, synthesized stereo for monophonic soundtracks, and HDCD-capable stereo. All existing TheaterMasters can be upgraded to DVD capability at a cost of $495, and DTS capability for an additional $795. Some special discounts apply for combined DVD/DTS upgrades, and TheaterMaster owners who purchase the EAD SwitchMaster® video switcher are entitled to a free DVD upgrade. Call EAD for details. We are also working on other DTS-capable products, including a high-end DTS CD player to be introduced at around a $2,795 price point.

6. Our advice would be to go for the maximum quality that you can afford, also to go for a design that is designed from the ground-up to process 5.1-channels, and is upgradable. Top quality does not come cheaply. The irony of this is that if the mass market manufacturers could take a design like the TheaterMaster and apply the economies of scale that they are good at, this sort of quality could be obtained at much lower price points. TheaterMaster has established a reputation for no-compromise movie and audiophile sound quality that is as good as it gets (see, e.g., Edward J. Foster's review in *Audio*, March 1996). The TheaterMaster is also upgradable, and in its 18-month lifetime in the marketplace has had several upgrades, including DTS. Over twenty TheaterMasters are used in the film industry for both mixing and QC of Dolby Digital soundtracks.

7. Audiophiles and videophiles can rely on EAD to continue to keep abreast of all

Gary Reber, Widescreen Review

1. What were the compelling reasons for your company to become a licensee of DTS® Digital Surround technology?
2. How do you see the differentiation between DTS Digital Surround and Dolby® Digital (AC-3) in terms of performance and market perception?
3. What impact on home entertainment and home theatre systems do you foresee for multi-play CD releases encoded in DTS Digital Surround?
4. Would you like to see DTS Digital Surround become one of the standard coding standards for DVD, Digital TV (HDTV), Digital VCR and DSS?
5. What are your company's plans for products incorporating DTS Digital Surround and at what price points and how soon do you expect to introduce product?
6. Now that our readers will have the opportunity to experience both discrete multichannel music in their home and in their car on DTS-encoded CDs, and motion pictures in their home theatre on laserdisc and DVDs encoded in Dolby Digital and DTS Digital Surround, what advice would you provide for them as they are considering the purchase of a new surround processor or an upgrade to their present equipment?
7. Do you have any other comments on the direction of your company you expect to offering product featuring DTS Digital Surround?

significant new developments in audio and video. EAD has been right at the leading edge in its efforts to introduce high performance audio technologies to the quality-conscious consumer. Among our achievements we were the first to ship HDCD, Dolby Digital, and quite possibly DTS Digital Surround (we shipped our first DTS-equipped TheaterMaster to Thailand in August 1996, with the first production batch following in early October). All of this technology relies on our highly-acclaimed AccuLinear® analog stages, and our Switched-Resistive Array volume control technology. This volume control technology was most recently praised by Robert Harley in the October 1996 issue of *Stereophile*, page 232.

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EIGER Systems

Jim McGall

Vice President, Sales And Marketing

1. EIGER Systems began preliminary engineering efforts on our forthcoming DTP-1 digital surround processor earlier this year. As a performance audio company, our comparative studies of the existing surround sound formats (matrix and discrete) led to the conclusion that the multichannel theatre audio experience could be substantively improved. The opportunity to add DTS Digital Surround to our platform became clearly essential as our final product development continues, due to the high quality coding of the DTS algorithms.

2. This should not be a war, but an alliance of ideas. Both formats can and should be complementary systems to each other as the discrete surround sound category matures. Both offer superior steering and sonic effects when compared to matrix formats in the cinema at home. Dolby® AC-3® offers the highest market value through its long heritage of audio signal processing, particularly in the home theatre arena with first Dolby Surround, then the ProLogic® solution. DTS, in our view, should be positioned on its own merit as a high-performance multichannel audio system, especially well suited to both cinema and music-only releases. In fact, the multichannel music-only release might be the single most important defining element for DTS, when compared to Dolby AC-3.

3. We at EIGER agree that a convincing argument can be made in favor of DTS Digital Surround for music-only multichannel encoded releases. With source material recorded using the highest production values, multichannel DTS Digital Surround sound recordings can impart a sense of depth and spaciousness—even the ambient nuances of a particular concert hall venue—that no two-channel recording can adequately recreate.

4. Absolutely, as an alternative. Customers are ultimately empowered by their ability to choose. DTS Digtial Surround should be offered as a performance alternative, a market-driven choice made by the artist, producer, manufacturer and ultimately, the consumer.

5. EIGER Systems plans to release our digital surround sound platform, with DTS Digital Surround included, by mid-year, 1997. Pricing and features will be forthcoming as we get closer to initial product shipments.

6. Insure that the planned processor purchase has inherent modularity incorporated within its design, in order to upgrade to the DTS Digital Surround format.

7. None for EIGER Systems, with respect to our position and our product development. We are committed to offering the finest surround sound processor we can produce, one that includes the outstanding benefits of the DTS Digital Surround format.

Many in the industry are concerned, of course, with the "chicken and egg" problem that any new software format (such as DTS Digital Surround) faces—even after a consensus on the standardization of that format has been adequately addressed. Important questions still remain—for example, at what future date will sufficient software be available to play on the numerous planned component offerings? Will the music retail industry chafe at yet another format requiring dedicated shelf space? Should there be premium pricing on the multichannel audio recordings, and if so how much? How can music-on-demand services, DSS and other Internet providers feature DTS Digital Surround-encoded material in their delivery schemes? Finally, will the consumer embrace music-only multichannel sound releases—with the quadraphonic fiasco of 20 years ago still fresh in the minds of many audio enthusiasts?

The answers to these questions, of course, will ultimately be resolved by the commitment to excellence we and the rest of the worldwide DTS partners bring to this exciting new surround sound format.

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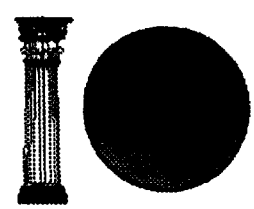

IO Technologies

George Ioakimedes

President

1. The Coherent Acoustic® Coding (CAC) algorithm is an exceptional advancement in consumer audio. Achieving six channels of transparent quality 20-bit audio allows a new level of entertainment in home theatre to be enjoyed by the consumer. This is more than just the next step in surround sound. DTS® Digital Surround brings a new level of involvement that far surpasses anything else available. There is no compromise by using DTS technology!

2. With DTS 20-bit sound quality and 1.411 megabits per second data rate, recording engineers can create a realism and we as manufacturers can provide the means to deliver it. Dolbyís® digital system offers a compromise that fits a mass market need. With DTS Digital Surround you obtain near perfection for the audio purist and a home theatre upgrade for the over 6 million U.S. households with digital capable laserdisc and CD players.

Dolby Laboratories introduced the public to improved audio—from the Dolby B cassette in 1970, Dolby ProLogic® Surround in 1987, to the recent Dolby Digital or AC-3® format. The public knows the Dolby name and what they have done to expand the audiences' listening experience. DTS is the new kid on the block and although they have over twice the theatre installations as does Dolby, the market still does not know the DTS Digital name.

3. It is exciting to think of the possibilities that could be encoded using DTS Digital Surround technology and DVD or even CDs. To be able to be on-stage with the performers and know where each musician is, that is the heart of what lies ahead. I think once the general audience can experience this they will be hooked on this new format and a massive growth of audiophiles will begin.

4. Without a doubt! I believe that for DVD, DTS Digital Surround has already been recognized as the alternative audio format. To be extended to the other platforms would and should be a natural extension.

5. We are currently working on an add-on surround sound processor with video switching to be introduced in early 1997. Pricing has not been set at this point.

6. I think that most people will first be interested in the home theatre aspect and what surround sound has to offer them. If someone currently has a laserdisc player I would highly recommend that they wait a few months and see what DTS Digtial Surround products will be available. Soon products will be available that can have both surround formats and they could judge for themselves what Dolby and DTS sound like.

7. We are excited to be a licensee of DTS Technology and look forward to introducing our product. We have no plans for other products at this time but will wait to see what the market prevails.

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Chiro
BY KINERGETICS RESEARCH

Kinergetics Research
Anthony DiChiro
President

1. There were many compelling reasons for licensing the DTS® Technology. Being a high-end audio and home theatre equipment manufacturer, the most important is staying on the cutting edge of technology and offer that cutting edge to the consumer. DTS Digital Surround offers one more opportunity of achieving that goal.

2. I see no differentiation requirement between DTS Digital Surround and Dolby® Digital. You need to have both. I get asked all the time what's best. There is no answer to that question, except you need both. Let me say this to you: don't all great theatres have DTS Digital, Dolby Digital, Dolby Surround and THX®? So should a consumer deserve any less? Furthermore, DTS Digital Surround has the capability of delivering much better transparency, because it can utilize the highest data rate a recording format allows.

3. I think it is going to be a major advancement because artists have the capability of involving the listener in music in a very precise way that is controlled by each artist. There have been many methods tried with simple stereo to emulate this surround effect. These give a nice effect, but cannot control the sound content with the precision of discrete channels.

4. I would like to see it used in any platform that makes good sense.

5. We have two products with DTS Digital Surround. The first is the Chiro C-5.1 that works in conjunction with the C-800 Processor/Preamp through the DB-25 interconnect. The price for the C-5.1 is $1,298. We had an introductory offer for the first 100 DTS Digital Surround units for $100, but that went fast. Standard price for the optional add-on is $500. The HPHT KSP-5.1 will be available in December at a retail price of approximately $2,000, with DTS Digital Surround included.

6. My advice to the consumer is to only purchase processors that have multichannel inputs and will upgrade to DTS Digital Surround. The future in music and home theatre is exploding with new and wonderful technology that can be taken advantage of with upgrades and multichannel input capability.

7. We have a very exciting concept that we are working on utilizing DTS Digital Surround, but that's for another day.

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KRELL

Krell
Dean Roumanis
General Manager

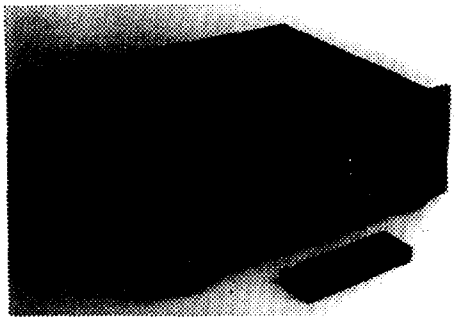
1. We got involved with DTS® Digital Surround because we feel the format has the potential to become one of the standard formats and the buyers of our products are very interested in it.

2. From conversations with our accounts and end users, it is clear that Dolby® Digital has a very high level of acceptance as a significant improvement over ProLogic® and THX®. Everyone who purchases our Audio Video Standard desires that function. DTS Digital Surround is considered interesting and desirable as well among our customers, but is not yet considered as essential as Dolby Digital is.

3. We feel it is too early to make a meaningful comment of the future of music-only releases with the DTS Digital Surround format. There is virtually no discussion about this among our accounts or end users. We believe nothing will happen unless major labels get involved, which does not appear to be realistic in the near term.

4. Yes, we would like to see DTS Digital Surround as one of the standard encoding formats.

5. Our current plans are to add DTS Digital Surround to the formats offered



Krell Audio Video Standard

for our Audio Video Standard.

6. Our advice would be to purchase a surround sound processor built to accept new formats as they become available and build and develop home theatre systems with similar quality speakers and amplification all around.

7. Krell has always been committed to making the most technically advanced, best sounding audio products. We will include DTS Digital Surround in the appropriate products should it become one of the standard formats for home theatre and music-only applications.

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MADRIGAL
MADRIGAL AUDIO LABORATORIES INC.

Madrigal Audio Laboratories, Inc

John Herron

Product Development

1. Providing a wide variety of high quality digital inputs, digital crosspoint switches, extensive DSP, and six or more channels of D-A conversion does not come cheaply. For this reason, we feel it would be foolish to ask for a significant investment on the customer's part without providing for maximum flexibility. In our Digital Surround Decoder for the Proceed PAV, we have done everything possible to avoid obsolescence. Providing for DTS Digital Surround is simply one aspect of that philosophy. In short, if there is going to be DTS Digital Surround-encoded software available, we feel our customers should have the opportunity to enjoy it. Why would anyone want something that limited them to some forms of software and precluded the use of others?

2. It is wrong to see them as either/or propositions. Inclusion of Dolby® Digital is imperative in any digital surround decoder for the obvious reasons: it will be an incredibly widespread format, and a great deal of digital surround software (particularly movie soundtracks) will only be available in Dolby Digital. You simply have to have it.

By contrast, DTS Digital Surround appears to be having greater success in the music industry, where their original goal of "better than CD quality sound" has been well received. The DTS Coherent Acoustics® algorithms are scalable to higher bit rates than Dolby Digital, which is important for those of us concerned with musical accuracy and realism. Anyone who has ever heard a 20-bit master compared to a noise-shaped 16-bit version understand how valuable 20-bit resolution is, and this is what DTS has been working toward from the beginning.

3. Madrigal has recently been involved in making some truly historic piano recordings, including what may well be the world's first four-channel 96 kHz 20-bit masters (captured on two Nagra D open reel digital recorders slaved to one another). We are releasing some of this material in traditional 16-bit form this fall. But early next year we hope to release another disc of the same material with DTS Digital Surround encoding, allowing people to hear it in discrete four-channel, 20-bit form. Having heard the masters reproduced in their native four-channel, 20-bit form, we are incredibly excited by the prospect of releasing this material this way. DTS Digtial Surround gives us a delivery medium without which we could not possibly share this great music at its best with a wide range of customers. Based on our own experience, we can certainly understand why DTS has enjoyed the successes they have in the music business. People are going to be stunned at the realism possible with multichannel recordings that enjoy 20-bit resolution.

4. Of course we would like to see higher bit rate/lower compression soundtrack options available. Companies like ours are dependent on high quality audio software to make our products valuable—what would be the point of a Proceed or Mark Levinson system if the only available source was AM radio? But you must understand that there has to be a "lowest common denominator" soundtrack that is universally available in order for a new format to survive and flourish. You must have a huge installed base of affordable hardware out there in order to capture the attention of the people who make the software. Dolby Digital will in all likelihood provide that lowest common denominator soundtrack, and that's fine. It's a good system.

Fortunately, in this digital world, new formats can be designed that have redundant soundtracks. People who are willing to buy a more powerful, more flexible component can then choose among the two or three soundtracks provided. We would love to see DTS Digital Surround become one of these "optional" soundtracks, since its status as an "option" would not fragment the software market the way a competing standard would. No one needs another VHS vs. Beta war.

5. We are now finishing up the hardware design for the Digital Surround Decoder, a companion piece to the Proceed PAV. It is designed to work seamlessly with the PAV, allowing PAV owners to add digital surround capabilities to their systems when they feel there is enough software to justify the additional investment.

The Digital Surround Decoder will feature a software-upgradable DSP engine and a modular hardware design for maximum flexibility. This is like the difference between on old-fashioned dedicated word processor and a modern computer. Rather than using a one-trick pony (a dedicated chip for Dolby Digital, another dedicated chip for DTS Digital Surround, etc.), we have designed a general-purpose audio computer with over 240 MIPS of computing power. This powerful DSP engine loads whatever software is needed at the moment from FLASH memory that can be updated easily as new formats are introduced. Thus, if and when a DVD-Audio standard is finally agreed to, our product should be able to accommodate it with a simple software update.

Similarly, we are designing our own digital interface circuitry for this product in anticipation of the higher speeds that such a DVD-Audio standard might require. (No currently available, off the shelf part can handle the necessary bandwidth.) But even if the as-yet undetermined DVD-Audio standard calls for some new type of connector that we could not have foreseen, updating the hardware would involve a simple card swap.

The Digital Surround Decoder will support eight channels in the main theatre, which can be set up as a 7.1 channel system (an option in MPEG-2 audio), or 5.1 channels with separate side and rear surrounds for large rooms, or to provide three separate, independently adjustable subwoofer channels (left, right and rear

Gary Reber, Widescreen Review

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7. Do you have any other comments on the direction of your company with respect to offering product featuring DTS Digital Surround?

subs, for example).

We expect to ship the first units in January 1997. Final pricing has yet to be determined. If your readers are interested in more detail, they can check out our Web site (http://www.madrigal.com) or ask their local dealer for our paper on New Digital Audio Formats, which discusses these issues in more detail.

In addition, we are planning a somewhat simpler, all-in-one-box product for introduction sometime in the first half of 1997 that incorporates much of the technologies of the Digital Surround Decoder. This will include a software-upgradable DSP engine, but have somewhat more limited I/O capabilities and expansion possibilities than the Digital Surround Decoder-based system.

6. We live in rapidly changing times. New digital audio formats are being discussed at every turn. We are obviously concerned about this for the same reason your readers should be: no one wants their new product to be made prematurely obsolete by the introduction of something that could not have been predicted during the design of the product.

Thus, we would strongly recommend that people look for flexibility and upgradability. Although DVD-Audio is probably a long way off, it isn't unreasonable to think that it may become a reality at some point during the life of a multi-thousand dollar product being considered today. What has the company done to ensure compatibility and/or upgradability with such future development? What is their demonstrated track record for upgrades, like on previous products? Is there tangible evidence of a real commitment to taking care of their customers? Without these considerations, you could soon be left with a costly boat anchor.

Lastly, remember that you get what you pay for. Always buy quality (long-term) over technology (short-term).

7. One of the real challenges that advanced multichannel audio systems present is creating a human interface that allows people to do the things they want to do, simply and without unnecessary complication. In this day and age, it is necessary but not sufficient to have great performance. You must also have excellent build quality, reliability, longevity, and you must make the product easy to use. In fact, we feel strongly that the product must be a pleasure to use. Anything else is poor design.

Madrigal has a full time staff of industrial designers to help make the products both more attractive and more intuitive in day to day use. We spend hundreds of hours on a product such as these working out the details of how people will set it up and subsequently use it. People from Industrial Design, Engineering, Sales, Marketing and upper management all become involved in developing the best possible human interface. We also use people outside the company as beta-testers, as a reality-check on our work. We feel that unless you go to such extremes, even the best product can be compromised by being difficult or impossible to use.

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McCORMACK AUDIO CORPORATION

McCormack, Inc.

Joyce Fleming
President

1. We became a DTS® Digital Surround licensee because of the fabulous sound it produces. I have had the opportunity to listen to each format and I was floored by the huge difference DTS Digital Surround made. Because I did not want to listen to the other formats, I assumed that our customers would not either.

2. While DTS Digital Surround certainly has the advantages in terms of performance, I believe that Dolby® Digital has more visibility in the marketplace because of Dolby's role with cassette tapes. It will be very important for DTS Technology to continue to expose customers to the advantages of their format.

3. The certain impact will be more enjoyable music in consumers' homes. This will be of great benefit to our industry because the more people who enjoy their home entertainment systems, the more time they will spend with them and the more strongly they will recommend them to others.

4. It is very important for DTS Digital Surround to become one of the platform coding standards for all sound and music formats. Its current sonic superiority demands this action. However, I feel that to prevent hesitation in the marketplace, the most important point is to make today's products upgradable to tomorrow's standards.

5. We are designing a preamp-processor with DTS Digital Surround capability. It will cost approximately $2,500 and be available next year.

6. I believe the most important features for consumers to keep in mind when making a purchase are, first, that the unit be DTS Digital Surround compatible today and second, that it be upgradable to future improvement from DTS or other sources.

7. We plan to include DTS Digital Surround capability in all our surround sound processors and I urge other manufacturers to do the same. It is simply too good to be ignored because some other company has a more recognizable name.

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BOOTHROYD STU/
MERIDIA

Meridian Audio
Bob Stuart
Chief Designer
Chairman Of The Board

1. Meridian considers it essential to offer our customers full freedom of access to pre-recorded software, and to offer it with the very best performance. For that reason we were right at the forefront in offering Dolby® Digital in a proprietary form. We decided to offer DTS® Digital Surround because they were showing all the signs of getting a useful base of software into the marketplace. The clincher was that some of the DTS Digital Surround formats have been written (albeit at a discretionary or optional level) into the DVD 1.0 specification.

It is our firm intention that the Meridian 565 and 861 Surround Processors be the very best at decoding ALL the sound options in DVD—so that means we are working on programming the very best DSP solutions for Dolby Digital AC-3®, DTS Digital Surround and MPEG audio.

2. No comment!

3. I think the music CD option of DTS Digital Surround is extremely interesting. DTS Digital Surround obviously works well for music at the CD bit-rate and offers a rich alternative to the surround enthusiast. I think there are two potential dangers that may stand in the way of the success of that format. First, it will be important that the DTS Digital Surround music discs are encoded using 5 full bandwidth channels. In my opinion, it would be the gravest error to lay down music in a 5.1 format—especially if (as some have suggested) all the bass information be stripped out into the 0.1 channel. After all, any sensibly-designed surround processor can look after the speaker layout. Secondly, DTS Digital Surround on CD has unlucky timing. By the end of next year, the DVD will be around. DVD has considerably more potential for music—including supplying pictures with Linear PCM, DTS Digital Surround or MPEG audio. I suspect that those readers interested enough to buy a DTS Digital Surround decoder will also buy a DVD player for movies.

4. DTS Digital Surround is one of the coding formats permitted in DVD. I would not like to see any new formats propagated into broadcast because I think it is in the general interest to keep those channels and equipment simple. I don't mind which format they choose—just pick one!

5. Meridian plans to offer DTS Digital. Surround as an option in its 565 Surround Processor. All existing 565s can be upgraded to include Dolby Digital and DTS Digital Surround—and will also be upgradable to MPEG audio. We will announce exact pricing and upgrade information in December and plan to be shipping DTS before February 1997. The Meridian 861 Surround Controller will do Dolby Digital AC-3 and DTS Digital Surround out of the blocks. We had planned to offer DTS Digital Surround somewhat earlier, but chose to delay in order to be certain that our decoder was not only the best for laserdiscs and CDs, but was set up for the quite different performance and hardware requirements for DTS Digital Surround in DVD.

6. The advice is simple. Chose a unit that is completely flexible in its hardware and software architecture. You are much better off with something like the Meridian 565—not only do we write the algorithms and decoding software in-house and so attain exceptional levels of transparency—we can adapt those modes to changing circumstances, installation setups and formats. Pick a Meridian: any Meridian!

7. Well lastly, as I have hinted at earlier, the Meridian implementation of DTS Digital Surround is an in-house effort. We are not buying a pre-programmed Motorola processor, our DTS runs on an incredibly powerful and upgradable processor structure. DTS sits right inside that architecture; all the great features we brought to Dolby Digtial AC-3 come with DTS Digital Surround—including very sophisticated bass management, speaker protection systems, and last (but not least) THX® for DTS Digital Surround.

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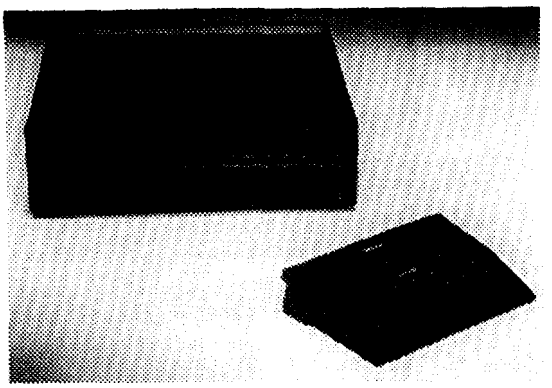

Meridian 565

MSB
TECHNOLOGY

MSB Technology
Larry S. Gullman
General Manager

1. We, at MSB Technology, have our roots in high end audio. Ten years ago, MSB founded with the introduction of one of the first high performance CD players. We embraced this new technology completely, believing that it would ultimately offer a tremendous advantage over vinyl. Since then we have worked to improve the format with transports and D-A converters that draw every bit of realism from the music, as have many others. In recent years, we have been looking for the next generation product. We considered HDCD to be too little, too late. We are disappointed with the direction Dolby® Digital has gone. After reading the first technical paper presented by DTS® a few years ago, we felt that this was the technology that would bring us the next generation in music and we wanted MSB to lead the way.

2. The DTS Digital Surround and Dolby Digital algorithms are both very flexible and thus very similar in many ways. The major differences we see are in implementation and market orientation. Dolby Labs and Pioneer very ingeniously worked the AC-3® compressed 5.1 movie track into an unimportant part of the LD bandwidth. This tremendous achievement put Dolby Digital software into the hands of consumers worldwide, who did not even know what it was. Now, with the market awakening to the benefits of discrete 5.1 sound, consumers will be more likely to seek out dedicated DTS Digital Surround music and movies. It was very fortuitous for DTS that Dolby was able to introduce 5.1 in a ProLogic® compatible system. Without the introduction, home DTS

Gary Reber, Widescreen Review

1. What were the compelling reasons for your company to become a licensee of DTS® Digital Surround technology?
2. How do you see the differentiation between DTS Digital Surround and Dolby® Digital both in terms of performance and market perception?
3. What impact on home entertainment and home theatre systems do you foresee for multi-only CD releases encoded in DTS Digital Surround?
4. Would you like to see DTS Digital Surround become one of the platform coding standards for DVD, Digital TV (HDTV), Digital VCR and DSS?
5. What are your company's plans for products incorporating DTS Digital Surround and at what price points and how soon do you expect to introduce product?
6. Now that our readers will have the opportunity to experience both discrete multichannel music in their home and in their car on DTS-encoded CDs, and motion pictures in their home theatre on laserdiscs and DVDs encoded in Dolby Digital and DTS Digital Surround, what advice would you offer when they are considering the purchase of a new surround processor or an upgrade to their present equipment?
7. Do you have any other comments on the direction of your company with respect to offering product featuring DTS Digital Surround?

Digital Surround products would be difficult to market.

From a hardware point of view, DTS Digital Surround and Dolby Digital are also very similar. Both decode a digital bitstream, expand it to six digital data streams and send them to three pairs of D/A converters. Our DTS Digital Surround upgrade takes advantage of this similarity. When we add a DTS Digital Surround processor to an existing Dolby Digital or digitally processed ProLogic surround processor, we monitor the incoming bitstream and when DTS is detected, substitute DTS data on the six digital data streams before they can reach the D-A converters. The result is a fully automatic DTS Digital Surround/ Dolby Digital processor without replacing any part of your existing system, for only $699.

3. We see the music only CD releases as the primary driver of DTS Digital Surround. Most consumers, retailers and reviewers have not experienced DTS Digital Surround in a quality environment. You literally feel like you are on stage with Alan Parsons. It is a quantum leap in the listening experience. We have specifically designed our DTS upgrade to accommodate a wide range of listening environments. Our upgrade can be configured to down-mix a 6-channel mix for 5-, 4- or even 2-channel audiophile-grade systems. This gives everyone access to the exciting new 20-bit software being prepared for DTS Digital Surround release.

4. Of course, we all wish the home theatre market was influential enough to demand high quality audio and video on all media, but we are not quite there yet. When DirecTV® reduced the number of letterbox channels from 2 to 1, we could see the direction the programmers were heading. DVD and DSS are both targeting the mass market. But mass market products can be improved for home theatre and DTS Digital Surround may well reach them eventually. We started to improve DSS sound by offering our digital audio output upgrade for any DSS receiver over a year ago. We now offer our new DSS receiver modification with a component video output. When they broadcast DTS Digital Surround, we will decode it, but our numbers just don't warrant the allocation of programming bandwidth yet.

5. MSB Technology currently offers a DTS Digital Surround upgrade to any Dolby Digital processor or receiver, digitally processed ProLogic processor or receiver or any D-A converter. These upgrades have a list price of $699. Although we initially did all our upgrades in-house, we have been licensing very capable distributors and retailers worldwide to perform our upgrades locally. We think this painless single upgrade approach to DTS Digital Surround dramatically boosts its acceptance. We also began shipping our Dual Digital Processor in November with a list price of $1,495. It is fully automatic Dolby Digital/DTS Digital Surround processor configurable for 2-, 3-, 4-, 5- or 6-channel operation. It contains a Dolby Digital demodulator, Zoran and Motorola processors and 20-bit DACs. It also offers a totally unique set of optional digital outputs. Now, for the first time, external D-A converters of the customers choice can be used with surround sources.

6. We urge readers to consider carefully the decision to replace expensive equipment with new equipment that may be obsolete in another year or so. We at MSB offer a complete upgrade path that will allow virtually any home theatre to be conveniently upgraded to both Dolby Digital and DTS Digital Surround at a fraction of the cost of complete replacement equipment and with MSB's acclaimed audiophile performance. Our upgrades include a Dolby Digital (AC-3®) RF output upgrade for LD players and a 5.1 input upgrade for any processor or receiver, allowing an outboard Dolby Digital/DTS Digital Surround processor to be incorporated into the system. The upgrade path is flexible and allows one to cost-effectively keep up with the rapidly changing world of digital processing. And the best thing about upgrading—you don't have to learn a new remote and reconfigure that bundle of cables behind the rack.

7. A final word about our approach to DTS Digital Surround. We feel that mix flexibility is very important for the proper reproduction of music. With our DTS Digital Surround products, we don't merely tolerate, but rather have specifically designed for two or four channel music applications, DTS is great in movies, but is really much bigger than just movies. We at MSB are working with music industry professionals, assisting in developing techniques for mixing and decoding music CDs to best reproduce the experience intended by the artist. These decisions impact new productions as well as influence the vast Quad libraries that will be re-released. This area should be carefully evaluated when comparing products.

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PERREAUX

Perreaux
Duncan Perreaux
General Manager

1. As a high-end manufacturer of leading edge amplification products, Perreaux sees the opportunity to become a charter licensee of DTS® Digital Surround as an extension of the "new" digital surround era. The ability to offer multifaceted preamp-processors and public demands for high-end home theatre products are the driving force behind the decision. The professional applications of DTS in the theatre industry worldwide speak for them-

selves and we feel it is not an illogical decision to expect no different accolades from the consumer product.

2. Although Dolby® Digital and DTS Digital Surround share similarities in 5.1 technology, DTS Digital Surround will be able to provide superior audio performance in both laserdisc and DVD movies and music-only modes due to its less compressed signal. With this improved performance in mind, it is our feeling that the marketplace will view DTS Digital Surround as an upscale format and Dolby Digital will be the mass market format.

3. Music-only CD releases encoded with DTS Digital Surround should be the major selling point for DTS Digital Surround to gain a foothold in the market. Quadraphonic sound in the 1970s was a major revelation when it was introduced. Can you imagine the interest when the format actually sounds good? Mixing engineers will become artists like never before, recorded music will have the potential to reach new plateaus with DTS Digital Surround encoding.

4. If DTS Digital Surround could be incorporated into DVD, Digital TV (HDTV), Digital VCR and DSS in its non compressed format, it would be an obvious choice by each of the above. Unfortunately, it does not appear that this option is available in all of the above formats. It is quite obvious that each of the parties responsible for the "new" video sources did not prioritize sonic quality when deciding on its audio format. If sonic quality was the main objective, none of the above formats would have settled for a highly compressed signal. All high-end manufacturers would likely see their products perform to their highest abilities. With this in mind, certainly we would like to see each and every format opt for maximum performance levels, thus making DTS Digital Surround available as an audio platform.

5. Perreaux will introduce a state-of-the-art A/V preamp processor, Model AVP6, in early 1997, featuring full digital operation with the option of 2-channel stereo via analog. The AVP-6 will include an internal DTS Digital Surround processor and an optional outboard Dolby Digital processor. The AVP-6 will have an anticipated list price of about $4,995.

6. The only words of wisdom we have to offer with respect to upgrading a home theatre or car stereo system is to plan your new system wisely, seeking pertinent information and advice from publications such as *Widescreen Review*. It is imperative that the system have enough amplification and dynamic headroom to satisfy the huge demands on full range digital surround formats. Power is even more important today than ever before. Insufficient amplification will result in premature amplifier clipping. The combination of fantastic dynamic range and full frequency surround speakers will put the best systems to the test. The important thing to keep in mind is the fact that there are so many poor sounding Dolby Pro Logic® systems in the market, but there are also a fair share of outstanding systems as well. Both the good and the poor systems utilize similar technology in the encode/decode processes, so the rest of the system often is the difference between a bad, good and outstanding system. You are making a substantial investment in new technology, do your homework, don't be disappointed.

7. Perreaux will continue the development of products incorporating DTS Digital Surround as long as the consumer market demands its inclusion. We are very excited about the "extras" DTS offers over other digital formats. With our background being high-end stereo, the availability of music with DTS Digital Surround encoding is particularly exciting.

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Rane Corporation

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1. Presently Rane participates in the home theatre market with equalizers and multichannel power amplifiers. Should Rane at some point in the future decide to offer decoding equipment, DTS® Digital Surround would be included. For the present, we are a licensee in order to stay informed of DTS Technology and their growth while we investigate market opportunities.

2. DTS Digital Surround's true discrete channels with increased data conversion precision and minimal compression should be anyone's preference. We strongly believe that for the best possible performance, audio should undergo the least amount of processing. Having said this, however, it appears that an overwhelming majority of people cannot distinguish between the two. Given this and Dolby's® considerable presence, it's difficult to imagine that they can be overtaken (e.g. Beta format didn't overtake VHS).

3. Depends a great deal on what happens with DVD. If DVD were not a factor, it is doubtful that surround sound CDs from anyone will capture much of the market in homes. Like someone once said, Americans listen to music in their cars and watch TV in their homes. Expand TV to include home theatre and we think you have the crux of the problem. Surround sound CDs should find their way into the automotive market first, since most of the hardware is already in place, unlike home music systems.

4. Yes.

5. None at the present time.

6. It must have Dolby Digital and expansion means to include DTS Digital Surround and other possible processors, assuming they're not already included.

7. (No further comments.)

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Rotel Of America

Michael J. Bartlett
Vice President And
General Manager

1. DTS® Digital Surround's sonic promise is intriguing: effective 20-bit resolution for multichannel music sources could be high-end audio's next frontier. Many of our customers are already investing in home theatre systems so a DTS-capable decoder certainly isn't a cost-prohibited option.

In addition to music specifically scored

Gary Reber, Widescreen Review

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for multichannel playback, there's re-issue potential for record companies, as many existing master tapes are multichannel to begin with. But dual inventory (the same music on two CD-like but mutually exclusive formats) will be a major hurdle on the retail front.

The automotive market holds major potential for 5.1-channel sound. DTS Digital Surround-encoded music in a good mobile system is impressive, classical pieces particularly, so as recreation of the acoustical environment-ambiance and depth-is phenomenal.

Modern music is more problematic. We're used to hearing music coming from in front of us-that's just how we listen. But it will probably take aesthetically challenged producers some time to stop playing musical ping-pong-ping-pong-ping with their new toys. Even in the classical genre, musically satisfying antiphonal works are few and far between.

2. Dolby® has created consumer awareness of discrete digital multichannel sound but we think it's a bit premature and confused. We need a standard—something viable and readily available—before consumers will accept it on a wide scale. A software platform like DVD would be ideal. Currently, only "early adopters" are buying Dolby Digital products and some are going to be disappointed to discover that their units can't be up-graded to other formats. But what else can you expect from "politically priced" products? We have high hopes that political issues, those that have so far precluded integration of Dolby Digital and DTS Digital Surround decoding capabilities in the same IC, will soon be resolved. This would make the format question moot and is necessary if DTS Digital Surround is to succeed on the video front. Until then, end user confusion is inevitable and will slow sales.

DTS is still playing catch-up in the PR battle, although, if consumer calls here are any indication, they are making up ground quickly. Again, it is early adopters who are asking questions.

3. As I've already mentioned, multichannel music-only discs might be a good thing for the software companies with lots of re-issuable material in the vaults. I immediately think of the Lucasfilm experience with *Star Wars*: They've released a number of versions (THX®, Letterbox, CAV etc.) and people go back to buy it again and again. In Japan, MiniDisc® is very popular and seems to have taken over the old cassette tape market completely. Japanese software companies are reissuing back catalogs of old albums in the MD format quite successfully. Although there may be some validity in comparing Dolby Digital sound quality to MD and DTS Digital Surround to that of CD, I think we tend to forget that MD is a hell of a lot better than the tape format most consumers have been very happy with for decades. Home theatre owners are natural customers for 5.1-channel recorded music. Their systems are already configured to get the best from it and a comparatively inexpensive DTS Digital Surround decoder won't pose a major sales hurdle. Put DTS Digital Surround into the car and you can enjoy multichannel at home and on the way to work. Seems pretty logical to me.

4. DTS Digital Surround is already an alternative standard for DVD. DTS Digital Surround-encoded 12-inch laserdiscs will be out soon and DTS Digital Surround audio discs are available now. The market will decide if the technology has "legs."

In addition to the politics involved, the question of standardizing DTS Digital Surround for other formats (HDTV, DSS, etc.) is a technological issue. How much bandwidth is available, how much of a delay would result from rewriting specs to include DTS Digital Surround, etc? We've already seen a split audio standard for DVD with Dolby Digital the delivery system of choice for North America and Asia and Philips' Musicam (MPEG) for Europe. More "standards" will just confuse the picture further and should be avoided if at all possible.

I am not moved by the comparison between Beta/VHS and DTS Digital Surround/Dolby Digital as I don't think it's accurate. All video discs will carry a conventional ProLogic®-encoded stereo soundtrack so they'll be playable on "K-Mart specials." The fuss is really about the discrete digital format. If politics could be set aside and decoder ICs would handle both Dolby Digital and DTS Digital Surround data-streams, the user would have a better product and the software alliances could offer discs in their preferred choice (or combination of choices) with the knowledge that consumers wouldn't be caught in "format indecision."

5. Rotel plans to bring out a modestly priced, no frills DTS Digital Surround decoder early in 1997. The units we make now for home theatre application are compatible with both Dolby Digital and DTS Digital Surround adapters. We are developing a surround processor with both technologies for introduction next season.

6. The best advise to give a customer? Don't buy a receiver! The next step is to make sure that, whatever they buy, it's flexible and can be upgraded. The safest purchases today are amplifiers and speakers. Spend money there and be prepared to change processors sooner rather than later as developments occur. A lot of off-air TV, particularly for users of DSS, is broadcast with Dolby ProLogic. This remains a particularly satisfying format and involves a lot less expense than diving into a full Dolby Digital package, especially now when only 100 laserdiscs have Dolby Digital soundtracks.

I really feel for all those folk who have dropped thousands of dollars on integrated Dolby Digital receivers only to discover there are no ports to add a second decoder. The fact that *Widescreen Review* is preparing this article should tell people that the format wars aren't over. Users need to be flexible and not get themselves tied in too tightly with all-in-one products. With nearly 10,000 laserdisc titles in the market, it might be just as well to stay with the laserdisc format for a while longer.

7. For 35 years, Rotel has implemented technologies that enhanced the sensual enjoyment of listening to music. With the shift in consumer interest from audio to video, we're following developments very closely and offering products that add to the home theater experience now and are ready for the next jump into high definition multichannel music reproduction.

DTS Digital Surround is good technology, it works in more than 7,000 theatres worldwide, it certainly deserves to be heard in the home.

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THETA DIGITAL

Theta Digital Corporation

Neil Sinclair

President

1. We realized that surround sound was definitely part of the whole home entertainment marriage of audio and video, and that Theta Digital would have to provide for surround sound in any video or A/V product we brought out. To us, that meant doing a lot of research, exploring all the possible options, to decide which technology offered the most potential for fulfilling our perfectionist design goals.

DTS® Digital Surround offers some technical capabilities which are simply beyond the parameters bounding any alternative surround sound format. We heard an initial demonstration when DTS Digital Surround was in the prototype stage, which was interesting, if not amazing. Knowing that the capacity was there, we got a DTS program running on an early Casablanca, and listened to a DMP recording—that's when I heard the most convincing digital sound I've ever experienced. It sounded real. This is why we decided we had to offer DTS Digital Surround in addition to the more well known Dolby® Digital.

2. Most people have heard of Dolby, because that is the noise reduction standard on everybody's cassette deck. For the last eight years, Dolby ProLogic® has been surround sound. It follows naturally to accept their standard for discrete surround sound. Dolby does an excellent job, and succeeds in making surround sound available on an almost universal scale, because it is a standard so easily agreed upon. What DTS offers is a format designed specifically as a high quality, high fidelity audio medium, providing for extremely high bit rates. Dolby's data rate capability is 32 to 640 kilobits per second, which is fine, but DTS's data rate goes much further: 32 to 4,069 kilobits per second. It's data compression is much gentler (a 3:1 ratio vs. Dolby's 12:1). DTS can deliver six channels of 20-bit audio at 48kHz. All of this makes DTS Digital Surround just about irresistible to key people at recording studios, who are very excited at the advantages this offers. The world needs both standards, for different reasons.

3. The first DTS Digital Surround-encoded CDs have already been released, introducing audiophiles and serious music lovers to their awesome realism and staging. People are already getting multichannel home systems for movies, and they'll want to use all the channels for music reproduction, if they can get an improvement that way. DTS Digital Surround is a way to make music compatible with multichannel systems, because music requires an utterly transparent medium. Dolby's system, at the data rate presently implemented, is not transparent enough to satisfy the most demanding music listeners. DTS Digital Surround is going to be a very pleasant surprise to those who have heard and disliked phony ambiance constructs—DTS Digital Surround recordings can capture the actual concert hall ambiance as the recording is made, and deliver a higher sense of reality than just the stage in front of you.

4. Yes. Absolutely. Particularly on DSS; few people realize how good DSS sound can be if you use a high quality D to A converter.

5. Casablanca is just beginning to ship to dealers now. Casablanca is our open-architecture master component which can incorporate various functions, including video switching, preamplifier, D to A conversion, digital crossover, and choices of surround sound formats. There are, as well as a number of choices as to what kind of component functions Casablanca has, two levels of quality. Prices for different configurations range from about $4,500 to $12,500. DTS Digital Surround is a $500.00 option.

6. When surround sound meant analog-based ProLogic, rear channel sound was rendered diffused and blurred by manipulating and randomizing phase information, and had very poor separation. People were told that, ideally, you would have separate systems, one for music listening, one for movies. (Right.!)

Now, with discrete sound, what we really need to bring a system together that satisfies both needs is high fidelity components that capture the information as accurately as possible. We have even found that using a Casablanca in its surround sound modes will allow so much more dynamic "punch" to come through, in comparison with more compromised A/V units, that it seems as though the amplifier is delivering more power to the speakers.

We like to remind people to stay conscious of the overall quality of the system as a whole, and not to get fixated on single features, or on some part of the experience, at the cost of other important

Theta Casablanca

considerations. If your readers are putting together a state of the art system, they will definitely want DTS Digital Surround, as well as Dolby Digital. They will probably consider getting something like our Casablanca unit, and of course, we like to encourage that. The more modest system will require the help of a qualified, careful audio/video professional to assess the conflicting demands on their customer's resources, and advise accordingly.

7. Theta Digital has always been a leader in technological innovation, in the service of maximizing sound quality and musical enjoyment. We tend to pioneer new ways of doing things. Often, the radical improvements of one year are seen to filter down into more mainstream products later on. Theta will be, as always, in research and development mode to do everything we can to make stunningly good music and video experiences available to as many people as possible. ■

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